

## ABSTRACT OF THE DISCLOSURE

A light-controlled light modulator can achieve high-speed, low-loss wavelength conversion. Continuous  
5 light with a wavelength  $\lambda_j$  is launched into an MMI coupler via a port, and is split into two parts by the MMI coupler, which are led to a loop-type interferometer. In the loop-type interferometer, the two parts travel separately around the loop as  
10 clockwise traveling light and counterclockwise traveling light, are combined by the MMI coupler again via a filter-equipped phase modulator, thereby being emitted to the port. In this state, signal light  $\lambda_{i(s)}$  with a wavelength  $\lambda_i$  is launched into the  
15 filter-equipped phase modulator via a port. Even when the wavelength  $\lambda_i$  of the signal light  $\lambda_{i(s)}$  is equal to the wavelength  $\lambda_j$  of the wavelength converted output light, the wavelength conversion can be achieved with preventing noise from being mixed into  
20 the output light emitted from a port.